THE BULLETIN

Vol. IV No. 5

Hydro-Electric Power Commission of Ontario

NOVEMBER 1918

THE NOTCH, Montreal River

THE BULLETIN

PUBLISHED ON THE FIRST DAY
OF EACH MONTH BY THE

Hydro-Electric Power Commission of Ontario

ADMINISTRATION BUILDING
190 UNIVERSITY AVE.
TORONTO

SUBSCRIPTION PRICE:
ONE DOLLAR PER YEAR

CONTENTS

Vol. IV. No. 5
NOVEMBER, 1918

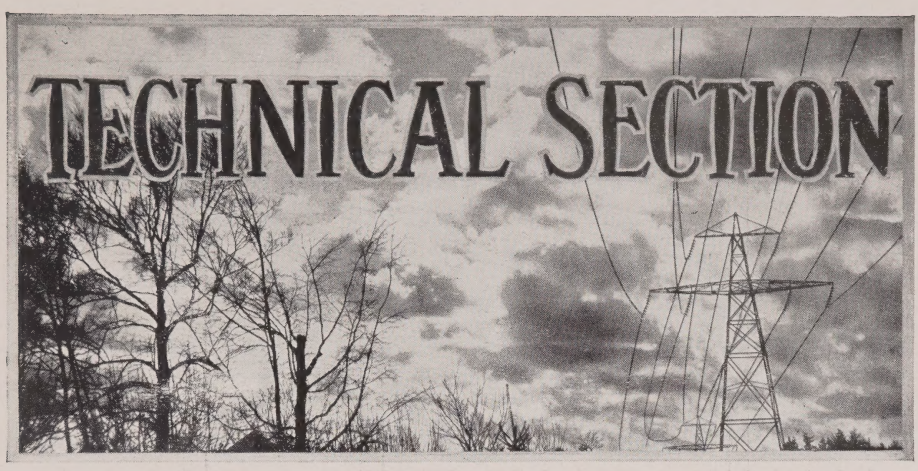
EDITORIAL

Peace—and Better Business

THIS issue of THE BULLETIN is published in an historic period. We have fought the fight to a finish and have won. And now comes the period of reconstruction, which is in some ways more of a problem than the conflict itself. From being organized for war we are faced with the responsibility of reorganization to a peace-time footing.

The same energetic, earnest thought which has been given to the problems of war will be necessary for the solution of commercial difficulties, now and later. Hydro officials and managers are without doubt cognizant of the situation and plans for an increased and still more efficient public service are already taking shape.

Municipal managers can assist us by giving us the benefit of their ideas for publication in these columns. Constructive criticism will have careful, thorough attention, and will be received in the spirit of furthering the object for which we are all working—better service to the people of Canada's premier province.



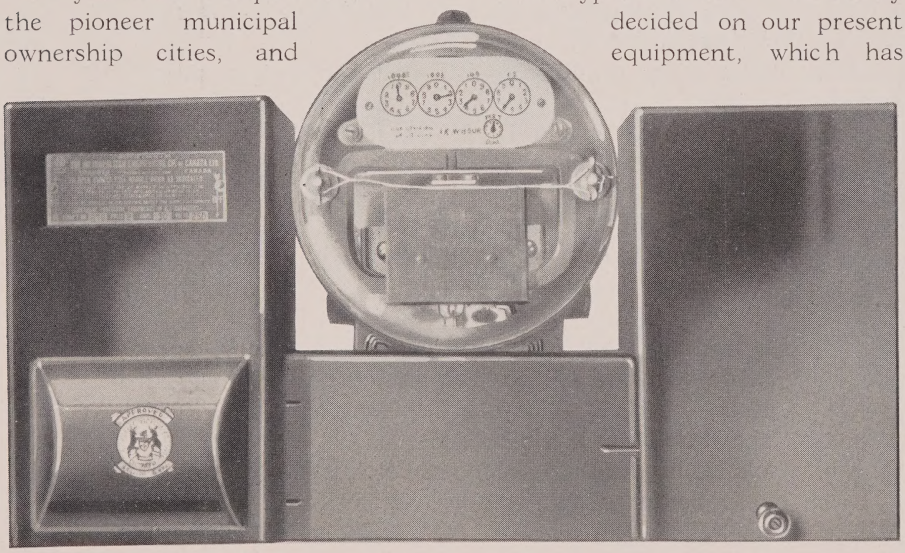
Service Boxes in Guelph

By JOHN J. HEEG

Secretary, Board of Light and Heat Commissioners of Guelph.

AS I have been asked several times about the style of Service Boxes used in Guelph I thought THE BULLETIN would be a good place to give a description of them.

As you know Guelph is one of the pioneer municipal ownership cities, and had about 1,200 services in use before the Hydro Power was turned on. When the order came through to instal sealed boxes we felt that something of a universal nature should be adopted on account of our having so many different makes and types of meters. We finally decided on our present equipment, which has



Type of service installation used in Guelph

been satisfactory. The main service box itself is of a standard type, but the meter adapter and distribution box is the unique part of the equipment. The meter adapter can be used on upper or lower, left or right-hand line meter connections, and will adapt itself to practically every make and type of alternating meter now in use on 110 and 220-volt circuits. The distribution box is made up in very much the same manner that flush switch boxes are made up, that is, the end can be taken out and a spacer used for as many cutouts as are wanted for the time being.

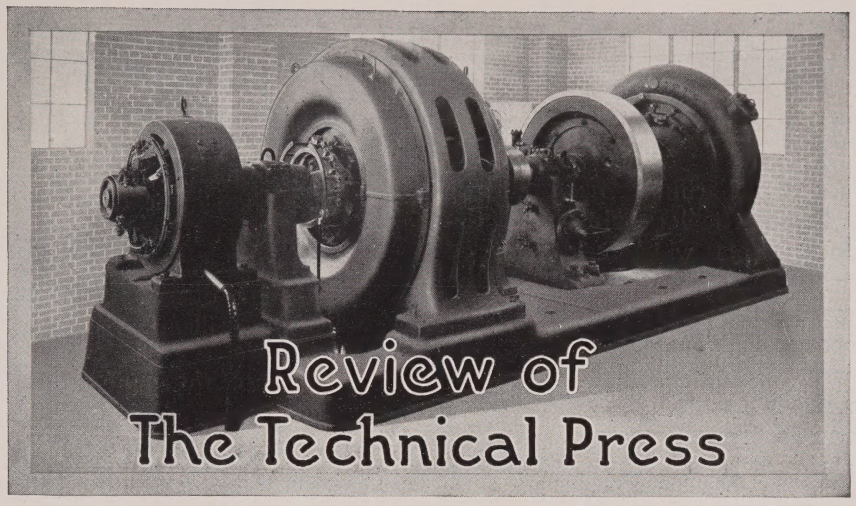
One feature in connection with this outfit, which was taken into account when designing the box, was that we could easily extend it without very much trouble in the event of extra circuits being required for appliances. This has proved to be correct, as we have added spacers and cutouts to different installations since they have been installed, and the work can be done with very little inconvenience and expense.

We do not think that the cost of these boxes will be any more than any other type of box, and, moreover, they make a very neat and compact installation.

Ten Ways to Kill An Association

1. Don't come to the meetings.
2. But if you do come, come late.
3. If the weather doesn't suit you, don't think of coming.
4. If you do attend a meeting, find fault with the work of the officers and other members.
5. Never accept an office, as it is easier to criticize than to do things.
6. Nevertheless, get sore if you are not appointed on a committee, but if you are, do not attend the committee meetings.
7. If asked by the chairman to give your opinion regarding some important matter, tell him you have nothing to say. After the meeting tell everyone how things ought to be done.
8. Do nothing more than is absolutely necessary, but when other members roll up their sleeves and willingly, unselfishly, use their ability to help matters along, howl that the association is run by a clique.
9. Hold back your dues as long as possible, or don't pay at all.
10. Don't bother about getting new members—"Let George do it."

Electrical Merchandising.



Water-Power Resources of the British Empire

By Chief United Kingdom Trade Commissioner HARRISON WATSON

London, August 23, 1918.

CANADA bulks very largely in the Preliminary Report of the Water-power Committee of the Conjoint Board of Scientific Societies which has just been issued.

It is stated that not only does Canada possess at the least 18 millions out of the 50 to 70 millions horse-power estimated to be the potential water-power of the whole Empire, but that the Dominion is one of the few portions which has made a systematic investigation of her resources, and the results of this and also information secured in this endeavor about water-power resources in other countries form a substantial proportion of the report now submitted.

While the value of hydraulic power has in the past received in the United Kingdom very little attention in comparison with its importance, this is probably largely due to the fact that the water-power resources of the United Kingdom are somewhat insignificant and indeed with the exception of Canada and New Zealand and, to a lesser degree, Australia, very little investigation of potential resources has been made, and only a small proportion of what is available has been developed.

It was, however, obvious that in the general stock-taking of the resources of the Empire, the necessity of which has been realized as a result of the war, the question of the water-power resources is of the utmost importance consequent upon the development, upon a scale never before attempted, of many industries destined to produce from within the Empire many articles which were previously brought into it from foreign countries, and the

inherent need of providing cheap power for these enterprises.

Additional stimulus has been lent to this particular subject by the important part which fuel has played in the conduct of the war, and the lessons learned have shown the vital importance of supplementing the forms of energy and heating most usually employed, i.e., fossil fuels and oils, by other means, of which water-power, as far as is at present known, appears to be the most readily available.

The Water-power Committee appointed by the Government for this purpose is composed of the best known scientific and technical authorities, and includes, as the representative for Canada, Professor J. C. McLennan, of Toronto University, who has also taken advantage of his presence in this country to direct attention to the magnificient water-powers of Canada, by giving before the principal scientific and engineering bodies a series of displays of films furnished by the Department of Trade and Commerce, illustrative of the chief powers existing in all of the Dominion.

It is stated that the committee was appointed "to report on what is at present being done to ascertain the amount and distribution of water-power in the British Empire," and the results of their endeavour to collect all available relevant information are described as having been both encouraging and disappointing, because in spite of the meagreness of the information regarding vast stretches of the Empire, sufficient data are available to show that its water-power resources are in the aggregate enormous.

In its preliminary report the committee has thought it desirable to exceed somewhat its terms of reference, and to devote some little space to the general question of water-power and its utilization.

Needs of the Empire

To enable the Empire to recover, with any degree of rapidity, from the financial burden imposed by the war, it will be necessary to develop, in a much greater degree than heretofore, its latent resources, and for this an ample supply of cheap energy must be available. This energy is required for the utilization of mineral resources and forests, and also for the adequate fertilization of the land and for the harvesting and transportation of its crops and products. Available sources of energy are fossil fuels, oil fields and shale deposits, and water-powers.

In considering the relative value and importance of these, it must be remembered that while solid and liquid fuels are convenient to handle and possess many advantages, their supplies are strictly limited and their ultimate depletion is certain, and long before supplies are actually exhausted their cost is sure to rise to a much higher level than at present.

For this reason, the utilization to the utmost possible degree of the water-powers of the Empire becomes of paramount importance.

The economic development of many of our tropical dependencies, whose latent wealth is practically

untapped, is directly inter-connected with the development of their water-power resources. Not only would an abundant supply of cheap power enable railroads to be operated, irrigation schemes to be developed and mineral deposits to be tapped and worked, but it would go far to solve the labour problem which promises to be one of some diffculty in the near future."

The World's Present Power Demand

While it is impossible to estimate with any pretensions to accuracy, the power now being used in various countries of the world, independent estimates tend to show that it approximates 120 million horse-power, including all steam, gas and water-power, made up as follows:—

Table showing rough estimate of world's present power:—

	Millions of Horse-power
World's factories, including electric lighting and Street Railways	75
World's Railways	21
World's Shipping	24
Total	120

Of the 75 million horse-power used for factories and general industrial and municipal activities, a rough approximation of the most probable distribution would appear to be:—

	Millions of Horse-power
United Kingdom	13
Continental Europe	24
United States	29
British Dominions and Dependencies	6
Asia and South America	3

It appears that between 15 and 16 millions of the world's industrial horse-power is at present developed from hydraulic resources, the following table showing the power developed in the various regions, and also the ratio of this to the total industrial horse-power, excluding railways:—

	United Kingdom	Contin'tal Europe	United States	Colonies
Millions of horse-power	0.8	6.5	7.0	2.0
Percentage of total industrial horse-power	0.6	27.0	24.0	33.0

It should be mentioned that the proportion of available hydraulic power developed in the United Kingdom is remarkable small, and in this respect it is the most backward of all the countries listed, except Russia, the percentage 8.3 comparing very unfavorably with the 43.3 of Germany.

The Empire's Water-Power Possibilities

In view of the lack of reliable data, except in the few cases already referred to, any estimate of the total waterpower of the Empire must be looked upon as highly speculative. The main powers are to be looked for in Canada, India, New Guinea and New Zealand, in which it is fairly certain there is potential water horse-power of the order of 40 millions. When to this are added the resources of East, South and Central Africa, Egypt, Ceylon, Tasmania, Australia, British Guiana, Burma, the Malay States and the United Kingdom, it appears that in the aggregate the hydraulic resources of the Empire are extremely large, and that they are as yet barely tapped.

There have been many good reasons for their comparative neglect in the past, including the general abundance of coal in proximity to

centres of industry; the necessity for a heavy initial outlay to bring the large powers into bearing; the lack of co-ordination between producers, users, and financiers; the lack of markets; and the remoteness of most of the powers from centres of activity. Moreover, the highly efficient combination of the hydraulic turbine and the electric generator, capable of handling large powers, is of comparatively recent development.

The developments in engineering science in the past decade and more particularly the developments in electro-chemical, electro-physical, and electro-metallurgical processes, and in the possibility of high voltage electrical transmission have removed some of these reasons. In transmission lines any distance is feasible electrically and mechanically, and only limited by financial considerations.

Electro-metallurgy and electro-chemistry have rendered it possible to handle materials not workable by any other means; have made available new materials; and have greatly cheapened the production of many important materials of wide use, notably aluminum, calcium carbide, chromium, cyanide, silicon, carborundum, while great progress has recently taken place in the production of electrolytic copper and zinc and in processes of the electric smelting and refining of metallic ores.

All these processes demand relatively large amounts of energy. As an example the world's production of calcium carbide was 340,000 tons in 1913, requiring 400,000 continuous estimated horse-power for its production.

Nitrogen Fixation

The report then deals with the enormous importance of water-power in the utilization of atmospheric nitrogen.

The world's annual consumption of nitrogen in its various combinations is about 750,000 tons, and the demand is increasing yearly. Four-fifths of this supply has been hitherto produced from natural nitrate deposits, but in view of their rapid depletion, and of the diminution in the fertility of most of the great wheat and cotton-growing areas of the world, the production of artificial fertilizers by some system of nitrogen fixation must, in the near future, become a question of vital importance.

At present the world's consumption of fertilizers approximates 6,000,000 tons annually, and this will probably be doubled within the next 20 years. The production of the equivalent of 12,000,000 tons of fertilizers by the cyanamide process would require 4,000,000 continuous estimated horse-power annually.

Cost of Hydraulic Power

The cheapness or dearness of energy is purely relative, and hydraulic powers which are not at present able to compete economically with steam, may in the not distant future be able to do so, while even now in favourable localities the cost compares satisfactorily with steam or oil power.

An examination of some 120 European installations shows that for large installations of upwards of 10,000 estimated horse-power, the minimum cost of the hydraulic works is eight pounds four shillings per horse-power installed, and the maximum, seventy-nine pounds six shillings per horse-power. In the majority of cases the cost lies between twenty-five pounds and forty-five pounds. There is also great variety in the cost of the turbines, generators, etc., while working costs run about one pound three shillings and six pounds eight shillings per estimated horse-power a year with an average of three pounds.

From these figures it appears that allowing for 15 per cent. interest and depreciation the cost for estimated horse-power per annum is in the neighborhood of ten pounds five shillings.

In many installations, however, the cost is very much less, that applied to the Hydro-Electric Power Commission of Ontario being one pound eight shillings. It is further estimated that many of the large powers in Canada can be developed at a total cost ranging from twelve pounds to twenty pounds per year estimated horse-power, in which case the annual cost per horse-power should not exceed two pounds to three pounds.

Necessity for State Control

The consideration already outlined would indicate that the conservation and utilization of the water-power resources of the Empire is likely to be one of the most important problems of our political economy, involving many complex questions.

In view of the immensity of the interests involved, the committee urges that nothing short of statutory control of these developments is desirable. The exact method of control is not for them to suggest. So far as is possible private enterprise should be encouraged, but under conditions which would prevent the perpetual rights being lost to the community.

Necessity for Preliminary Investigation

The report devotes considerable space to the extreme importance of thorough preliminary investigation, if only for the reason that "In spite of the great importance of water-powers, many of the potential powers in existence must of necessity prove economically useless, either on account of their great distance from centres of industry, the lack of transport facilities, or from the fact that the storage necessary to give a continuous or fairly continuous supply would be too costly," and the committee suggests that much can be done to ascertain the approximate possibilities of a potential scheme, before deciding to entail the heavy cost of a detailed survey by—

1. Installation and continuous recording of river gauges on all likely channels.

2. Installation and recording of rainfall gauges at suitable places.

3. Observation of river discharges for a series of gauge readings.

State of Investigation Throughout the Empire

At the present time the only portions of the Empire in which any

systematic attempt has been made to collect and tabulate the necessary data are Canada and New Zealand, and to a smaller extent Tasmania, New South Wales and South Africa.

For the remainder of the Empire, there is an entire lack of data on which to form a reliable estimate of the hydraulic resources. The committee consider that it is a matter of urgent importance that the preparation of hydrographic and meteorological data should be undertaken at the earliest possible date in the remaining dominions and dependencies.

The rest and the greater part of the report is devoted to an elaborate account of the water-power possibilities of the Empire as presented by the information so far available to the committee, which it is only possible here to summarize in the briefest manner.

The United Kingdom

Scotland, and especially the Scottish Highlands, offer greater water-power possibilities than any other part of the United Kingdom, because over a considerable extent of its area the rainfall exceeds 60 inches per annum, and this area is studded with natural locks, which form excellent storage reservoirs at considerable elevation.

An authority, Mr. Newlands, assuming that 28 inches of the total rainfall is available for power, calculates that a total of some 235,000 continuous horse-power is available.

The largest installation as yet developed in the United Kingdom is the Kinlochleven works of the British Aluminum Company, with an output of about 30,000 estimated horse-power continuously.

While in England there are larger rivers than in Scotland, there are fewer natural lakes, and the possibility of water-power development is also restricted by the general lack of elevation. Such powers, therefore, as are possible would be of necessity in comparatively small units, and must be developed without storage by utilizing the natural river flow.

Ireland's possibilities also appear to lie in her great rivers. The amount of power available is probably considerable, but without much closer investigation than has as yet been made even an approximate estimate cannot be given.

In the mountainous area of North Wales where the rainfall is high, two power installations have already been established developing some 12,000 estimated horse-power, and there are further possibilities well worth investigation.

In general, while the possible water-powers of the United Kingdom are comparatively small, yet, occurring as they do at no great distance from industrial regions, they are relatively valuable, and every effort should be made, by close investigation, to ascertain their commercial value at an early date.

India

Very little definite information is as yet available regarding the hydraulic resources of India. The power problem is in general complicated by the urgent necessity for conserving as much water as possible for irrigation purposes. A large

number of projects are under consideration, and the committee reports their general conclusions as follows:—

"In general the hydraulic possibilities of India appear to be very great. The country possesses in abundance the minerals necessary for metallurgical development, the climate and land for the cultivation of cotton, flax, juet, and many other commodities, and enormous population which, if trained, would provide abundant skilled labour. It is certain, too, that once it is determined by experimental trial for what crops and soils nitrogenous fertilizers can be used with profit to the cultivators, the demand for these, provided they can be produced at sufficiently low rates, will be enormous.

"The possibilities are so great and the available information so meagre that the question of the thorough investigation of the possible sources of water-power in the Indian Empire would appear to warrant immediate attention."

Ceylon

The amount of power should be considerable, but as yet the committee have been unable to obtain much information as to its probable magnitude. An authority estimates that at least 68,000 continuous horse-power is available at the falls of the Mahaweliganga, and about half as much from the River Walawe Conga.

Burma

A fair amount of information is available as to the great rivers of Burma, the Irrawaddy, and its tributary, the Chindwin, whose sources are situated in the mountainous country south of Thibet. The catchment area drained by the upper reaches of the rivers is about 80,000 square miles, and assuming it possible to utilize one-fifth of the discharge over a head of 500 feet, this would give a potential 7,000,000 horse-power.

British Guiana and British Honduras

Regarding both British Guiana and British Honduras, while the water-power resources of both are comparatively large, no definite information is as yet available.

Canada

As a tribute to the importance of Canada's water-powers, several pages are devoted to their description and utilization. As the general facts are, however, well-known throughout Canada, it is not necessary to reproduce them here.

Newfoundland

No estimate has yet been made of the water-powers of Newfoundland, but these are known to be of considerable importance. So far about 6,000 horse-power has been developed for general industrial purposes and lighting, and about 54,000 horse-power for use in the pulp and paper mills, and it is possible that the future demand for this latter purpose will be very large.

Australia

The water-power resources of Australia have never been systematically surveyed, and there is, consequently, a lack of data on which to base any reliable estimate.

"The apparent apathy in the past regarding water-power resources of

Australia is probably due to the fact that, in proportion to the size of the country, the probable available horse-power is small, and is concentrated on the eastern coast where is developed already an ample supply of coal. It is only in the islands of Tasmania and New Guinea that the prospects are notable in relation to their territorial extent."

Estimates have already been given of a few of the most promising powers of Tasmania, but no complete survey of the total water-power.

It is estimated that the possibilities are about 400,000 horse-power, and the country should certainly be capable of developing a relatively large amount of hydraulic power, because the rainfall exceeds 100 inches a year over a large area.

Regarding Australia generally it is stated:—

"Though comparable in area with the United States, there has yet been no notable hydro-electric development in Australia. Except on the east coast, the topography is too flat or the rainfall too low to provide the necessary conditions. Some of the large irrigation schemes are capable of being utilized for power production, but the aggregate of such possible power is small."

The report then devotes several pages to an account of a number of the best known powers, and of schemes which have been under consideration.

New Guinea

"The physical characteristics of New Guinea, its narrowness, its high mountain ranges, its large rainfall, ranging from 38 inches to over 200 inches, and averaging probably 130 inches per annum, offer exceptional facilities for developing water-power. There are numerous rivers of large volume and steep gradient, and while there is a general absence of data as to the discharge of these rivers, there is evidence that in the aggregate, the available power is enormous."

German New Guinea, the territory occupied by the Australian forces during the present war, has also great prospects. Altogether the potential water-power in the section of the island now under the British flag may amount to as much as 15,000,000 horse-power. On the other hand, owing to the complete absence of a hydraulic survey, it is impossible to say what proportion of the power is capable of commercial development.

New Zealand

"The physical characteristics of the two islands forming New Zealand render the country particularly well adapted for providing large stores of water-power, and for facilitating their development. The backbone of high mountains leads to heavy precipitation from the moist westerly winds, giving a mean rainfall of some 50 inches for the whole of the Dominion, while over a large portion of the South Island the rainfall exceeds 100 inches per annum. The mountain ranges are studded with extensive lakes, situated above a deeply indented coast line. The mountains of the Southern Alps attain a height of over 12,000 feet, and support many glaciers of large size

which act beneficially in equalizing the run-off throughout the year.

"According to official reports, the total available power is about 3,822,000 b. horse-power. This is at the rate of about 37 horse-power per square mile of territory, or 3.5 per head of the population.

"The power actually developed and in use in 1916 is given in the Government returns as 42,600 b. horse-power. Many other projects are, however, in course of construction or under construction.

"The outlook for New Zealand at the dawn of what promises to be an era of unexpectedly great electro-chemical, and electro-metallurgical activity, is most promising."

South Africa

The committee has not yet been able to elicit any definite information regarding the Union of South Africa, although the Government has recently instituted a board of inquiry to investigate potential resources. The outlook is not, however, particularly promising, owing to the seasonal character of the rainfall throughout the country. Upon the other hand it is known that a number of important falls occur, some of which should be capable of development.

Rhodesia

The rivers suitable for the development of large powers are in general very remote from present centres of industry, and few have as yet been utilized. The Zambesi is the most important and at Victoria Falls alone offers a potential power of something like 750,000 horse-power. While some of the other rivers are unsuitable, the Sabi system offers great possibilities and as there are large areas in its neighborhood of rich alluvial plateau land, which only requires irrigation to render it capable of bearing ample crops of sugar, cotton, rubber, etc., the possibilities are sufficiently promising to warrant a thorough hydrographical survey being carried out.

Regarding East Africa, West Africa and Egypt, the committee has been as yet unable to obtain any authoritative information. It is known, however, that in East Africa many promising waterfalls occur, the possibilities of which will probably repay investigation. Some considerable amount of power might evidently be developed from the regular flow of the Nile.

It is estimated that on the Gold Coast some 250,000 horse-power is available, and in Nigeria between 60,000 and 70,000 horse-power, while in these territories there are also several promising sites.

No information is available regarding the possibilities of the Malay States.

Recommendations

As they summarize very comprehensively the views of the committee, the recommendations which terminate the report are reproduced in their entirety:—

1. "That the British Government bring before the notice of the Indian Government, of the various Dominion Governments and of the governing bodies of the Crown Colonies, the necessity for a close systematic investigation of all reasonably promising water-powers, and of their economic possibilities.

2. "That the British Government take steps to ascertain whether the Governments concerned are prepared to undertake this work.

3. "That where such an inquiry is beyond the powers of any governing body, the British or Imperial Government place the work under the direct control of an "Imperial Water Power Board," or "Conservation Commission."

4. "That the Government take steps to initiate the formation of such an "Imperial Water. Power Board," or "Imperial Conservation Commission," to include a representative from each of the Dominions and Dependencies.

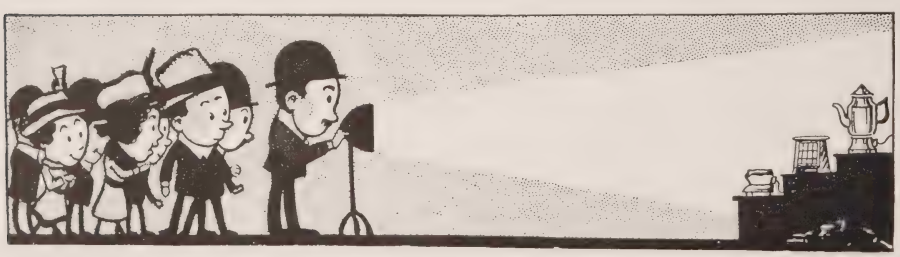
5. "That this Board act in an advisory capacity. It should decide on the sequence of such investigation work as comes under its purview.

It is suggested that all schemes for the development of which local resources are inadequate, should be submitted to the Board by the Governments concerned, and that the Board should make recommendations on which the Imperial Government might take action.

Such a Board would be able to take a broad and comprehensive view of the advantages to the Empire as a whole, attending the development of any given scheme and would be able to form a reasonable decision as to the relative advantages of such different schemes as might be brought forward from different parts of the Empire.

6. "That since it is unlikely that private capital will be available for many years for hydraulic development on any large scale, powers should be obtained to enable the State to assist or to undertake such development if thought advisable.

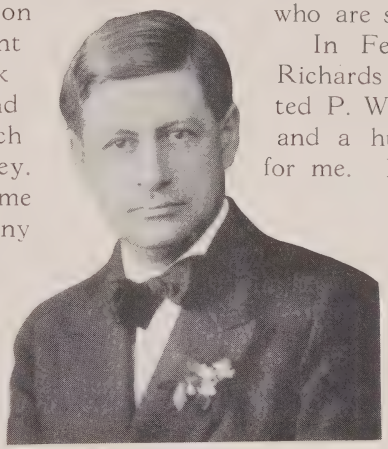
It is suggested that much might be done to attract private capital, if the State, after careful investigation, were to guarantee a slight minimum interest on the necessary capital, sharing at the same time in any profits beyond the amount necessary to provide that interest. By this method of assistance private enterprise would be untrammelled, and the management of the concerns so assisted would remain in private hands."—*Reprinted from The Weekly Bulletin, Department of Trade and Commerce.*



Who's Who in Hydro?

THE accompanying photograph was taken for passport purposes and is therefore general enough for any biographical sketch.

The original Yates on the western continent left England one dark night for Holland and settled with the Dutch in the Mohawk Valley. I was born in the same Dutch district too many years ago to make open confession pleasant, and after discovering how to get a B.S. with the least amount of work, I started in '98 with the Construction Dept. of the General Electric Co. and made rapid steps through the test, drafting-room and engineering office. After that to consulting work with Sargeant & Lundy at Chicago, and then with Stone & Webster, at Boston.



P. P. Yates

Here my fall began. For I went on the road trying to sell storage batteries, being given the Chicago district by the Gould Storage Battery Co.

On the 24th of May, 1906 I came into Canada and managed to unload some batteries on men who are still my friends.

In February, 1908, Ed. Richards and our late lamented P. W. agreed to disagree and a hurry call was sent for me. From that date to March, 1914, with the worthy assistance of a few others, I directed the destinies of the Hydro. On that date I took another downward step, and as the result of four years of abuse, I am now manager of the Public Utilities Commission of St. Catharines, operating the Hydro System and the City Gas, Manager of Grantham Township Hydro Electric System, Secretary of the Board of Trade, and Commissioner of Industries for St. Catharines.

C.O.S. Man Passes Away

We deeply regret having to report the death of a former bookkeeper at the Commission's Port Hope Office, Gunner L. B. Wilson, who died at sea of pneumonia on October 13th, after five days' illness.

Mr. Wilson left the Commission's service to join the 73rd Battery, afterward being transferred to a Tank Battalion and started Overseas on October 5th. He was buried at sea five days before the boat reached England.

Mr. Wilson had been with us over five years, and his death comes as a blow to the community.

NEWS FROM THE FRONT

Palace Hotel,
Edinburgh, Sept. 10, 1918.

Dear Hydro:

Your welcome letter of July 25, 1918, to hand some few weeks ago, but as we were so hard after Fritz of late, writing was out of the question altogether.

On the 1st of the month my leave warrant came through and took me away from the land of war and hardships, and has placed me up here where I am enjoying a few weeks' holiday.

My pal and I got away together, and believe me we are having the time of our lives after so long a spell out there in France.

On the morning of the 8th of August, we were on the right of Amiens where we let old Fritz know who we were, and before he got over the shock of that, we came up north again and gave him another drive in the ribs to the right of Arras.

When we left, they were still going strong and penetrated his Hindenburg line, which is some stronghold, take it from me.

Being a signaller, I had the new experience of going over the top with the infantry on August 8th to keep up communication with the artillery.

I got quite a number of good souvenirs which I sent home while on leave.

Everyone appears in good spirits at the present time, and our outlook is as it has never been before, so do not be surprised if some day soon we should finish up this long, weary war.

Glad to hear everything is going well at the Hydro.

We are enjoying our rest up here in Scotland for it does one good to be back among folks once more who speak our own language instead of that French lingo day after day.

We stopped in London two days, but Edinburgh is the choice of the colonial soldiers, for they think so much of us up here.

Seeing we have done so much travelling of late, we are making this leave a rest, not a touring expedition.

The food is very plentiful now, as the rationing has allowed everyone his fair share, so we have no difficulty that way. We are supplied with ration cards before leaving France, and it seems so queer carrying about one's own sugar which cannot be had on the table of restaurants and hotels. Sweets of any kind are very scarce and expensive.

I could tell you so much if time would permit, but you will have to excuse me for now also my bad writing for I have to write so many

whom I have neglected in the past two months.

Sincerely yours,
D. H. CHAMBERS,
No. 339,849,
1st Battery 1st Brig.,
C.F.A., B.E.F.,
France.

France,
September 14th, 1918.

Dear Hydro:

In reply to your letter of August 1st, I must thank you for having my BULLETIN sent me direct to this unit. I have not received July's issue yet, but expect it along any day now. I am going to try to give you a little idea of some of the troubles a lineman has to contend with in France, as much as I think will go through without incurring the wrath of the censor.

It would take up too much space to describe line work in detail from the Corps to batteries, battalions, etc., so I will give just an outline up to my own work.

We have what is known as a motor air line gang—their work is building pole lines in the rear—a lot could be said about their good work, but it is not my place to describe it now. From where they finish the divisional linemen take it forward to battalion and brigade headquarters, etc.

For a time my work was shooting trouble from division, but lately (and I may mention during the last offensive) I have been attached to an artillery section and my duty has been to maintain lines between brigade Headquarters and division. I'd like to say more here, but will have to leave it to your imagination.

In most cases these lines are laid on the ground only being put overhead at road crossings or other places where there is much traffic. In one place we strung our lines on what was up to lately a good pole route of the Germans, but this we found to be no better than being on the ground.

When shooting trouble a man is on duty all the time, and night or day he has to jump quick when his lines are out. Of course the quicker he is, the better, both for himself and everybody else, for if the line is put out by shells the sooner he gets it in again the sooner he is out of danger. Perhaps you can imagine a fellow's feelings when he comes in after a busy day and turns in for a good night's rest, and just before he gets laid down, he is called and told his lines are in trouble again. If the operator says it is full open, you are convinced right away that it is the work of a shell, and it is hard work sometimes to throw your nervous feeling before you set out, especially after dark. The line that is open is the easiest found, and the worst trouble to find is a "short" or "ground," that is caused by a small splinter just heavy enough to cut the insulation, and making itself fast between the two lines, or one side, and the ground. Where the lines are on the ground we run it through our hands, this being very difficult at times for it often goes over barbed wire, old trenches, and other obstacles too numerous

to mention. When it is overhead it is different—imagine being on top of a thirty-foot pole with shells coming over. We always work in pairs, so that if one does get wounded he has a chance, but if both should get it, well "nuff said."

A few months ago myself and a chum had about a mile and a half of overhead lines to patrol, and it was put out of action on several occasions by shells, and though we went out immediately, we never saw a shell burst while working on them, but I leave you to judge just about how long it took us to fix it up—we are speed artists when it comes to repairing lines under fire.

During this last big advance I have been on different fronts and have seen quite a few miles of German lines (overhead) and think our artillery ought to be congratulated on the fine work they done on them, for there was not in any one place a single strand of wire left on the poles, and in several places the poles were broken off with direct hits. If it happens that we mend a break and the operator is slow at giving us an O.K. test, and a shell happens to burst in sight, we don't mind telling him that he ought to be out on the lines instead of us; but when we are back safe in our dugout we forget all about it, and think they are the smartest men out here.

I think that after the war, some good writer will write volumes on the line work done out here, but I am no writer, so will cose.

Wishing the Hydro-Electric every success, I remain,

Yours truly, J. H. CORKILL.

R. A. F., FRANCE,
October 15, 1918.

Dear Hydro:

In the first place I must apologize for not writing sooner, but my time has been so fully taken up since I left Canada that I have found it rather hard to get the time, although I will admit I have been just a little lazy.

I have really covered so much ground that I cannot hope to give you more than a general outline of the many interesting things I have seen and done since I left. When we arrived in England we were sent to the Royal Naval College, at Greenwich for our ground school course, where we spent ten weeks and graduated in the following subjects:—engines, navigation, wireless and signals, theory of flight, aeroplane construction, meteorology and machine gun. It was a very interesting course, and we had to work very hard to cover everything in such a short time.

As you know, Greenwich is about six miles from the heart of London, and forms part of Greater London, so we had a very good chance of seeing the many interesting and historic places in and around the Metropolis, of which I took full advantage, as we had week-end leave each week, from Saturday noon until Sunday night.

We then went to Vendome, France, which is South of Paris, to our first flying school, where we actually learned to fly, as well as received advance courses in navigation, engines, etc. We spent six weeks there, and then returned to England to Cronwell Station, which

is in Lincolnshire. We had a few days in Paris on our way to Vendome, also a day on our way back, and managed to see a good deal of this beautiful city between the two trips.

At Cronwell we got an advanced course in flying where we learned how to do all the various stunts known to aviation, such as:— spinning, looping the loop, spiral dives, Immelman turns, rolling, side slipping, etc.; also advanced courses in the subjects we had already taken up at the previous schools, and finally graduated as a pilot on July 19th. This finished the ordinary pilot's course, but we were sent from there to Stonehenge which is on Salisbury Plains, for a special course of a month in night-flying, navigation at night, and bomb-dropping. This was the only station that I really didn't like, as the weather was very bad, so about a week before I finished the course, they were sending a draft of pilots over, and as I knew several fellows real well who were going, I asked to be sent along, so here I am.

I came out with a London, Ont. fellow and we had a very interesting trip across as we flew two machines over and as we are on the far side of France we stopped a night at Paris. We left the machines about a hundred miles from here, coming on to this squadron by motor car.

I enjoyed the trip immensely as the country round about here is very rough and mountainous, and a great many of the French villages and towns we passed through were demolished by shell fire which helped to make the scenery even more interesting.

We finally arrived here at 3 a.m. one morning just as the fellows were returning from a raid, and after hearing their experiences and relating our own, we retired.

Our quarters here are very good. We have a good mess, and last but not least, we live in huts which are divided into rooms, with two in a room. We have a piano and a victrola in the mess, so we do not lack for music.

As regards work, I can't tell you much about that. I am with a night bombing squadron, so we do all our work at night. I have a machine and crew of my own, the crew consisting of myself as pilot, an observer and a rear gunner. This is the actual flying crew, then we have our own mechanics, riggers, etc. I first made four trips over on the back as rear gunner to get acquainted with the country, and since then have made a good number of raids as pilot. The last time I went over as rear gunner Fritz put a machine-gun bullet through the carburettor on one of our engines, so we had to start back with the remaining engine full out constantly losing height and finally wound up on top of two large trees in the centre of a huge forest. We all escaped injury miraculously and thought first we were behind the lines in Germany, but soon ran across some French soldiers who told us we were just 4 miles on the right side of them. A couple of French captains took us in tow, gave us a bed and breakfast, also a full 6-course dinner with plenty of

wine and champagne next day. We had a look at the crash next day, and needless to say it was a complete wreck, but judging from what I could see of the destruction we caused to Fritz with our bombs, we sold her for a real good price.

I have had very good luck since I started piloting a machine myself. It's a very interesting and sometimes very exciting life.

I just noticed in the casualty list yesterday that another of the fellows in our draft from Stonehenge is missing. Out of the 7 I came over with, there is only Gunther and I left, and he has been in the hospital sick for the past 6 weeks. I think a number of them are prisoners in Germany, and one landed in Holland and is interned for the duration. This I think is an extreme case of hard luck, but it didn't take long to split our little party up.

We have a great many Canadians in the Flying Corps, and we have an American pilot with this squadron. He comes from Detroit, so we soon got acquainted. He is here getting experience in night bombing.

It has been raining almost constantly for the last two days, and when the weather is bad we have a very easy time—sleep till noon and have our batman bring our breakfast into bed, but we make up for this when good weather comes along, as we sometimes make long trips that take from 5 to 8 hours, and it is very tiresome flying, especially at night, but it is a life that has a great fascination and I would not change from this branch of the service under any circumstances.

The war has been going wonderful for us the last couple of months and looks a great deal as though the end may not be far off, but we are getting in such good shape, especially in this branch of the service, to give them H—— and to pay them many times over for what we received while preparing, that I am quite truthful when I say the majority of us would just like it to last long enough to show them what we really can do when we get fully under way.

This seems like a rather long letter, and as we are not equipped with the best writing material, you may have some trouble in making it all out, so I must close.

I hear from Walkerville and vicinity quite often, and I suppose by the time this reaches you the municipal political pot will just be getting nicely warmed up

Must close for this time, with kindest regards to yourself, J. J., R. T., and the rest of the H.E.P.C. bunch that I happen to know and remain,

Very sincerely,
D. B. McCOLL.

P.S.—I am with the 97th Squadron here, Independent Air Force, but my mail address is:—

Lt. D. B. McColl,
c/o Post Room,
Air Ministry,
Strand,
London,
England.

By J. F. S. MADDEN

WITH the ending of the war, many problems of reconstruction present themselves. Among the first to be considered is that of re-absorbing into our social and industrial system the returned men. In many cases men going to the front were promised that their places would be open for them when they returned.

Readjustment can best be made by new activities—Farming will appeal to many, if financial assistance is given. The Government will undoubtedly undertake extensive construction and will co-operate with and encourage private enterprise in work of this nature.

It is estimated that the electrical business in any given section of the country can be developed under favorable conditions to a volume equivalent to thirty dollars per capita per annum.

With practically unlimited electrical energy available in our province it would seem to be worth while devoting considerable effort to the complete realization of this possible development by utilizing electricity in our homes and factories universally or as nearly so as is possible. We should redouble our efforts to convince the public that the many electrical conveniences in the home are not luxuries, but necessities. At the same time the public should be safeguarded against inefficient, inadequate and inferior apparatus and appliances.

A big obstacle to the use of electrical appliances is inadequate house wiring and a real effort should be made to influence architects and builders to make proper provision for adequate wiring in all new houses being erected. At the present time a tenant objects to spending money for house wiring and the landlord has no incentive to do so.

In the United States, an attempt is being made to eliminate, as far as possible, duplication of standard wiring devices and the conservation idea which is a lesson of the war, is doubtless responsible for an attempt now being made to eliminate the inefficient carbon filament lamp as a matter of general thrift.

According to the *Electrical World* of September 7th, the Fuel Administrator announced on August 29th that the lamp manufacturers had:

"Voluntarily agreed to abandon the manufacture of certain types of the inefficient carbon filament lamp in accordance with the program which practically calls for the discontinuance of their manufacture and sale."

The official statement adds:—

"There are still a few isolated cases where the carbon lamp is required, such as on battleships where excessive vibration or shock calls for a lamp of the sturdy type. But with few exceptions, and these are confined to essential war industries, the program is expected to gradually eliminate the carbon lamp in favor of the the more efficient tungsten lamp."

"Central stations, public service corporations, municipal plants and others who may be using carbon filament lamps are being asked to assist the manufacturers as well as the Fuel Administration in working out this program, inasmuch as sweeping conservation measures are imperative if the war industries and essential public needs are to be supplied."

"The importance of this radical step may be judged from the fact that the program as formally adopted at yesterday's meeting will mean the saving of more than 1,000,000 tons of coal."

The program that the lamp manufacturers adopted consists:—

1. The elimination of unnecessary types of standard carbon lamps and of carbon lamp types for specia applications as follows:

The 120-watt standard multiple carbon lamp 100-130-volt range.

The standard 60-watt multiple carbon lamp 100-130-volt range.

The standard 20-watt S-14 bulb multiple carbon lamp 100-130-volt range.

The complete elimination of standard 30-watt and 60-watt round bulb multiple carbon lamps, and all other types of 100-130-volt range multiple carbon lamps with standard base used for decorative purposes.

2. The complete abandonment by central station companies of the installation and renewal of carbon incandescent lamps of all sizes, and discouragement of their use by their consumers and the public for any use or application for which tungsten lamps can be substituted; this policy to go into full effect not later than Sept. 15th, 1918, (postponed date Oct. 15).

3. The gradual abandonment of the installation and renewal of metallized filament "gem" lamps of all sizes by the central station companies and discouragement of their use by their consumers and the public for any use or application for which tungsten lamps can be substituted.

Under special and unusual conditions where it is absolutely necessary to use lamps with exceptionally robust filaments owing to rough handling or excessive vibration, the use of carbon lamps is recommended so that the metallized filament "gem" type may be completely

eliminated. This policy to go into full effect not later than Nov. 15, 1918. (postponed date Dec. 1).

4. It is recommended that the use of considerable numbers of the smaller sizes of lamps for commercial and industrial application be eliminated where it is practicable to substitute for them large single gas-filled lamps of highest efficiency in a smaller number of lighting units.

5. It is recommended that the use of vacuum tungsten lamps in sizes of 100 watts and over be eliminated and whenever practicable gas-filled tungsten lamps of highest efficiency substituted therefor.

6. It is recommended that electric light and power companies employ no differentials in their price schedules for the sale or renewal of lamps which may tend to encourage the use of larger sizes of lamps rather than smaller sizes.

7. It is recommended that all manufacturers of carbon and metallized filament "gem" lamps insert with each standard package of such lamps shipped by them a printed notice directing the attention of the user of the lamps to the fact that the particular lamps in the package should be used only on locations where it would be impracticable, because of excessive vibration and rough handling or for therapeutic and heating purposes, to use satisfactorily a more efficient type of lamp.

Manufacturers' Request to Users

It is recommended that the manufacturers use the following standard form for such notice:—

> Complying with the request of the United States Fuel Administration, you are asked not to use, or advise the use of, the lamps in this package in such locations, and under such service conditions where a more efficient type of lamp would be satisfactory
>
> (Signed) .....
> Manufacturer's Name.

8. It is recommended that when the United States Fuel Administration promulgates these regulations it should call the attention thereto of the public service commissions and other regulatory bodies, state and municipal, and should urge that where a public service corporation in order to comply with the terms thereof has the cost of lamp renewal service under the contracts with its customers substantially increased thereby, the public service corporation be permitted either to collect from its customers so affected the increase in the cost of the lamp renewal service, or discontinue the furnishing of free lamp renewal service and, where practic- able under present conditions, make therefor an appropriate adjustment.

9. It is recommended that the central station companies be requested to urge upon their customers and the general public in their advertising in the daily press, company house organs and in all promotion literature the importance of selecting lamps of sizes which do not provide an amount of illumination beyond what is strictly necessary, the exercise of due care in extinguishing of all lamps which are not needed, and the elimination of all extravagant

and wasteful use of light, as a measure of fuel conservation.

10: It is recommended that a pronouncement be prepared and submitted for the approval of the United States Fuel Administration to be distributed to all of the electric light and power companies of the United States, through the facilities offered by the National Committee of Gas and Electric service, calling attention to the urgent necessity of Fuel conservation and inviting the co-operation of all users of electricity, for light and power purposes, to a full compliance with the conservation program as finally approved by the Fuel Administration.

It is recommended that in the promulgation of the program by the United States Fuel Administration the co-operation of the manufacturers, electrical supply dealers and electrical jobbers be invited in order to secure the widest possible publicity for the conservation measure purposes, reaching in these several ways every class of lamp users through all the production and distribution channels.

11. It is recommended that the United States Fuel Administration communicate the program as finally adopted to the various government departments making extensive use of incandescent electric lamps, such as the Shipping Board, Army, Navy, Treasury Department, etc., and invite their co-operation in confronting with the program to the largest practicable extent.

Victory Bond Window Display, made by the Belleville Office, H.E.P.C.

HYDRO MUNICIPALITIES

NIAGARA SYSTEM

25 Cycles

	Pop.
Acton	1,570
Ailsa Craig	462
Aylmer	2,119
Ayr	780
Baden	710
Beachville	503
Blenheim	1,257
Bolton	727
Bothwell	695
Brampton	4,023
Brantford	26,601
Breslau	500
Brigden	400
Burford	700
Burgessville	300
Caledonia	1,236
Chatham	13,943
Clinton	1,981
Comber	800
Dashwood	350
Delaware	350
Dorchester	400
Drayton	613
Dresden	1,403
Drumbo	400
Dublin	218
Dundas	4,834
Dunnville	3,286
Dutton	840
Elmira	2,065
Elora	1,005
Embro	472
Erin	502
Etobicoke Township	5,822
Exeter	1,504
Fergus	1,679
Forest	1,421
Galt	11,920
Georgetown	1,654
Goderich	4,553
Grantham Township	3,133
Granton	300
Guelph	16,022
Hagersville	1,053
Hamilton	104,491
Harriston	1,563
Hensall	717
Hespeler	2,887
Highgate	427
Ingersoll	5,300
Kitchener	19,380
Lambeth	350
Listowel	2,291
London	57,301
Lucan	643
Lynden	662
Milton	1,947
Milverton	929
Mimico	2,004
Mitchell	1,656
Mount Brydges	500
New Hamburg	1,398
New Toronto	1,423
Niagara Falls	11,715
Norwich	1,093
Oil Springs	537
Otterville	500
Palmerston	1,843
Paris	4,370
Petrolia	3,047
Plattsville	550
Point Edward	937
Port Credit	476
Port Dalhousie	1,318
Port Stanley	849
Preston	4,949
Princeton	600
Ridgetown	2,080
Rockwood	650
Rodney	655
Sandwich	3,077
Sarnia	12,323
Seaforth	2,075
Simcoe	4,032
Springfield	442
St Catharines	17,91 7
St. George	600
St. Jacobs	400
St. Mary's	3,960
St. Thomas	17,174
Stamford Township	3,418
Stratford	17,371
Strathroy	2,816
Streetsville	500
Tavistock	974
Thamesford	504
Thamesville	742
Thorndale	250
Tilbury	1,605
Tillsonburg	3,059
Toronto	460,526
Toronto Township	5,008
Vaughan Township	4,059
Walkerville	5,349
Wallaceburg	4,107
Waterdown	696
Waterford	1,027
Waterloo	5,091
Waterloo Township	6,538
Watford	1,115
Welland	7,905
West Lorne	724
Wellesley	583
Weston	2,283
Windsor	26,524
Woodbridge	615
Woodstock	10,004
Wyoming	526
Zurich	450
Total	1,103,513

SEVERN SYSTEM

60 Cycles

	Pop.
Alliston	1,237
Barrie	6,866
Beeton	588
Bradford	946
Camp Borden	.....
Coldwater	617
Collingwood	7,010
Cookstown	635
Creemore	599
Elmvale	775
Midland	7,109
Orillia	7,448
Penetang	3,672
Port McNichol	500
Stayner	990
Thornton	250
Tottenham	517
Victoria Harbor	1,542
Waubaushene	600
Total	41,891

WASDELL'S SYSTEM

60 Cycles

	Pop.
Beaverton	821
Brechin	215
Cannington	746
Sunderland	570
Woodville	357
Total	2,709

NIPISSING SYSTEM

60 Cycles

	Pop.
Callander	650
Nipissing	400
North Bay	9,651
Powassan	572
Total	11,273

MUSKOKA SYSTEM

60 Cycles

	Pop.
Gravenhurst	1,600
Huntsville	2,135
Total	3,735

EUGENIA SYSTEM

60 Cycles

	Pop.
Alton	700
Artemesia Township	...
Arthur	1,003
Chatsworth	286
Chesley	1,975
Dundalk	750
Durham	1,520
Elmwood	500
Flesherton	428
Grand Valley	644
Hanover	3,310
Holstein	285
Horning's Mills	350
Markdale	904
Mount Forest	1,871
Neustadt	466
Orangeville	2,493
Owen Sound	11,819
Shelburne	1,115
Tara	590
Total	31,009

OTTAWA SYSTEM

60 Cycles

	Pop.
Ottawa	100,561

PORT ARTHUR SYSTEM

60 Cycles

	Pop.
Port Arthur	15,224

CENTRAL ONTARIO SYSTEM

60 Cycles

	Pop.
Belleville	12,080
Bowmanville	3,545
Brighton	1,337
Cobourg	4,457
Colborne	1,012
Deseronto	2,061
Kingston	22,265
Lindsay	7,752
Madoc	1,114
Millbrook	835
Napanee	2,881
Newburgh	444
Newcastle	611
Omemee	446
Orono	700
Oshawa	8,812
Peterboro	19,816
Port Hope	4,649
Stirling	823
Trenton	5,169
Tweed	1,350
Whitby	2,902
Total	105,061

ST. LAWRENCE SYSTEM

60 Cycles

	Pop.
Brockville	9,473
Chesterville	854
Prescott	2,630
Williamsburg	100
Winchester	1,065
Total	14,122

RIDEAU SYSTEM

60 Cycles

	Pop.
Perth	3,358
Smith's Falls	6,115
Total	9,473

ESSEX COUNTY SYSTEM

60 Cycles

	Pop.
Amherstburg	1,990
Canard River	50
Cottam	100
Essex	1,429
Harrow	375
Kingsville	1,633
Leamington	3,604
Total	9,181

THE aim of the Bulletin is to provide municipalities with a source of information regarding the activities of the Commission; to provide a medium through which matters of common interest may be discussed, and to promote a spirit of co-operation between Hydro Municipalities.